ROHDE & SCHWARZ

BESCHREIBUNG

Type XMA

Operating Instructions

RECORDER

Type XMA BN 444 512

ROHDE & SCHWARZ SALES Co., (U.S.A.) Inc:
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Passaic, N. J. PRescott 3-8010

Rot.4849
362
S 1
(20 S)

Note: Always quote the Type and Order Number (BN) in addition to the Serial Number (FNr.) of the set when asking for technical information and, in particular, when ordering repair parts.

Edition Rot. 4849/362

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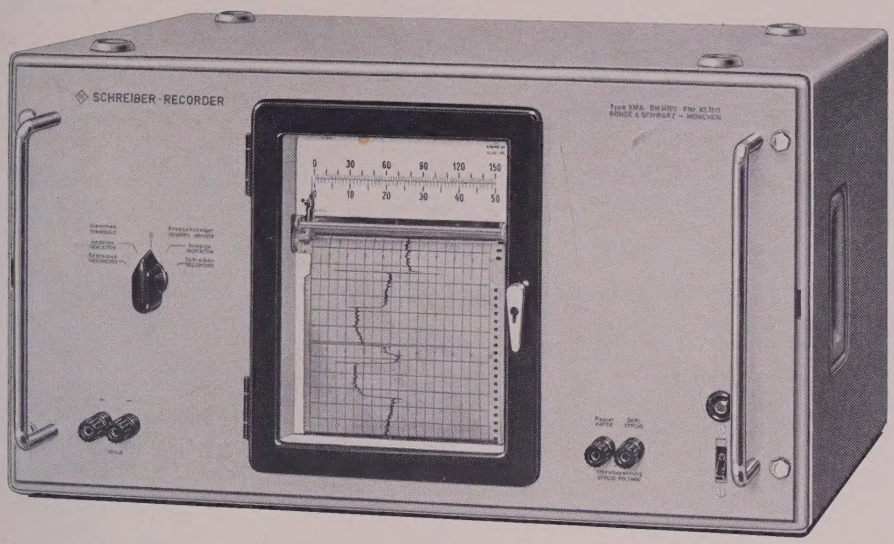
RECORDER 0 to 10 mA



Recorder for Frequency Indicator Type FKM and Decade Frequency Measuring Systems

In the Frequency Indicator Type FKM or in the decade frequency measuring systems equipped with the Type FKM, frequencies and frequency differences are transformed into proportional direct currents. The Recorder Type XMA has been designed to register these direct currents. The instrument contains a recording mechanism SD 12 V/Bv 508 RM (Siemens) which is suitable for mounting in a 520-mm rack, but is also available in cabinet form if needed as a portable instrument. Usually, metal paper is used. This does not smudge the operator's hands and permits photocopies to be made. The recording is obtained by a burning process using an auxiliary voltage which can be switched off whenever the mechanism is adjusted. Conventional recording by means of ink is only necessary in the immediate vicinity of sensitive receivers.

Specifications

► Order Number BN 444512

Meter movement	D'Arsonval type, class of accuracy 1.5
Measurement range	0 to 10 ma, meter resistance 55 Ω, approx.
Scale calibration	0 to 50/0 to 150, zero left
Type of recording	metal paper with writing electrode; ink recording on normal paper also possible
Calibrated width of paper	120 mm on paper 140 mm wide; length of visible part of paper 124 mm

960–284 E Printed in Western Germany

RECORDER XMA

Specifications (continued)

Paper speed	20/60/120 mm/hr with manual change; speeds of 5/15/30 mm/hr and 10/30/60 mm/hr possible by gear change
Paper drive	clockwork with electrical rewinding and 6 hours of reserve power
Takeup mechanism	coupled with paper drive
Inputs, switchable	4-mm knurled terminals on front panel; on the back multiple connector B 16 DIN 41621 for cable connection in the rack
Lamps and fuses	1 glow lamp RL 210, 1 0.6-amp fuse 0,6 C DIN 41571
Power supply	115/125/220/235 v, 47 to 63 cps 6 va/33 va, without/with the motor running

Order Numbers	BN 444512 Cabinet type with cover (R&S Standard Cabinet 581)	BN 444512 D Rack-mounting unit in accordance with DIN 41491, depth 300 mm
Dimensions	540 x 301 x 431 mm	520 x 270 x 390 mm
Weight	29 kg	17.5 kg

Accessories supplied with the set (covered by the order numbers quoted for the recorder)

1 power cord LK 333 (2 m), only for BN 444512
1 scale ruler with 2 scales 0 to 50/0 to 150, Siemens No. 259000/dz
3 rolls of metal paper with linear 15-division scale, distance between time calibration lines 10 mm, usable for any pen speed
1 case of accessories containing 2 recording electrodes, Siemens No. 259044, and 1 cleaning brush, Siemens No. 259047

Recommended Accessories (to be ordered separately; minimum quantity for paper: 20 rolls of each type)

1 special pencil for writing on metal paper, BN 18594
2 connecting cables for special pencil, LM 1201/100

Pen for ink recording, BN 18596-1 (Siemens No. 259030)
Special pen for very fine trace, Siemens No. 259038
Ink cartridge with violet ink, BN 185962 (Siemens No. 259041)
Syringe for cleaning of pen, BN 185961 (Siemens No. 259040)

Set of gears for 5/15/30 mm/hr (number of teeth 119/80/36)
Set of gears for 10/30/60 mm/hr (number of teeth 119/60/54)

Metal paper with linear 15-division scale, with 10-mm distance between time calibration lines but without time figures, usable for any pen speed, Siemens Type 12 ME/0, No. 259082/0

Paper for ink recording with linear 50-division scale, with 10-mm distance between time calibration lines but without time figures, usable for any pen speed, Siemens Type 12 NP 50/0, No. 259060/0

We reserve the right to make any departures from this specification, especially those considered desirable for reasons of improved design.

1. Preparation for Use

1.1. Putting into Operation

After shipment of the Recorder Type XMA examine the set by visual inspection for damages suffered in transit and check that all accessories listed in the data sheet are present.
Before connecting to the AC supply check that the fuses on the voltage selector (tapping panel at the rear of the chassis) are inserted to suit the available AC supply voltage. Withdraw the chassis from the cabinet after having removed the four screws on the edges of the front panel; when the set is provided for insertion into a cabinet rack, it is shipped separately (see Figs. 1 and 2). The Recorder Type XMA can be operated from the following AC supply voltages:

115, 125, 220 or 235 v ±10%, 47 to 63 cps.

When changing the fuses, take care that their ratings comply with the available AC supply voltage, namely:

50 ma and 160 ma for AC supply voltages of 220 and 235 v

100 ma and 300 ma for AC supply voltages of 115 and 125 v.

Suitable inscriptions on the tapping panel help to avoid mixing up of the fuses. After having checked the set and adapted to the local AC supply voltage, mount it into the cabinet rack or cabinet.

Assembling: Slide the chassis into the cabinet or cabinet rack and secure the front panel using the supplied screws. All connections are automatically made by multi-point connectors when the unit is slid in place. No soldering or screw connections are necessary.

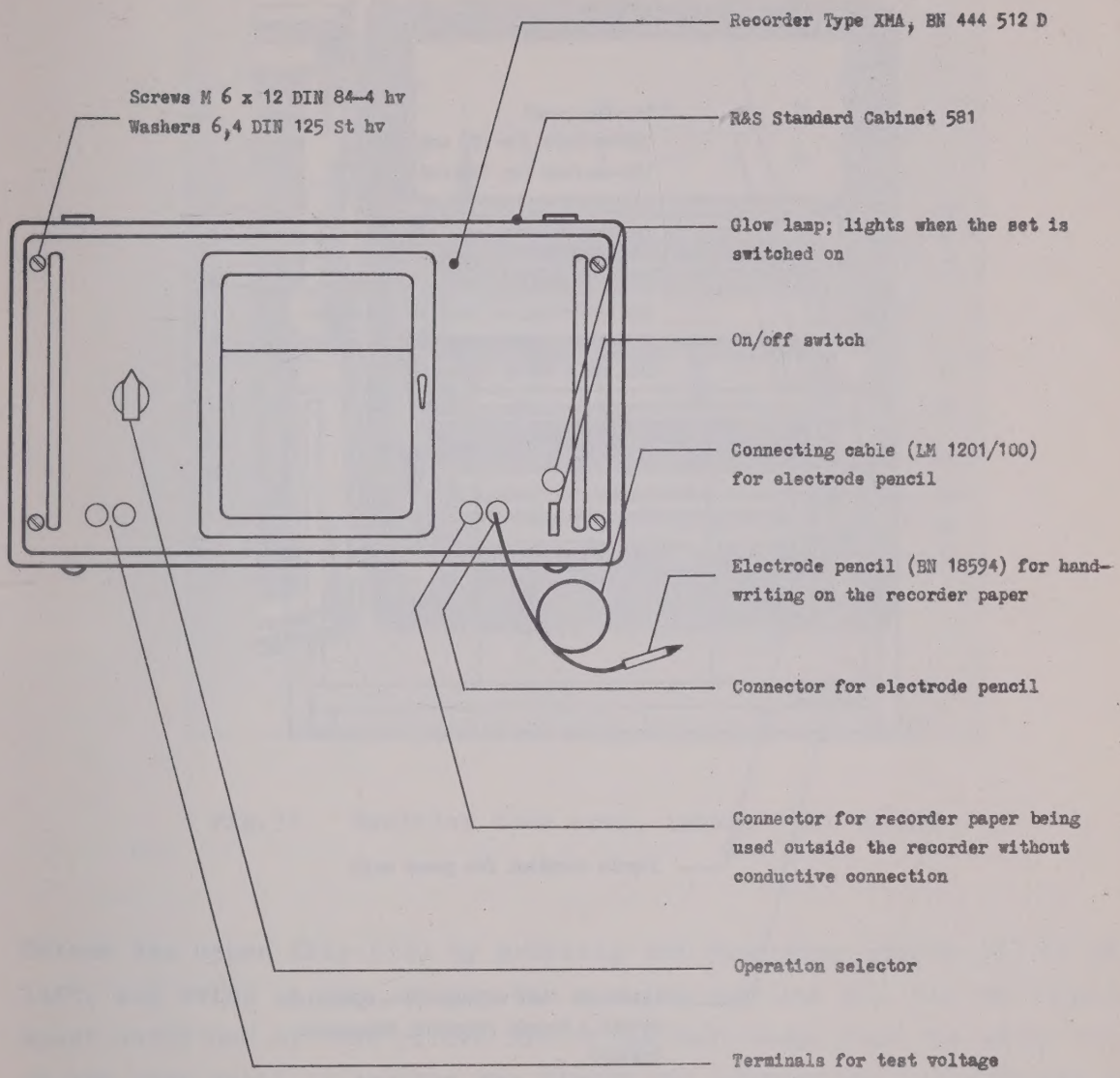
Setting up: When the Recorder Type XMA is used as an individual unit outside a Decade Frequency Measuring System, take care to set it up in a horizontal position. The front panel should not deviate more than 3 mm from the vertical plane along its height. Moreover the set should not be placed in the immediate vicinity of heat sources (temperature range 0 to 40°C).

Power supply: The power input is at the rear of the cabinet. Connect to a socket with earthing contact using the power cord LK 333 supplied with the set. If the set is operated within a cabinet rack, the AC supply voltage is applied via the connector provided at the rear of the rack and common to all units.

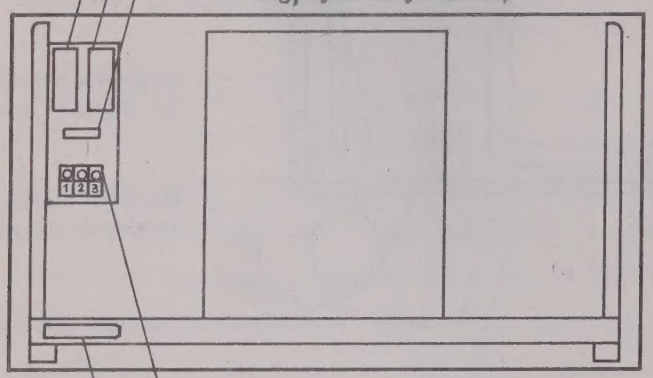
Releasing the locked pointer: When the door of the recorder is open the locking angle (2) (see Fig. 3) is accessible. It serves to lock the writing lever during shipment to avoid damaging the meter movement. Loosen the setscrew with a screwdriver so that the locking angle can be slid to OPERATION (○). Tighten the screw afterwards. When the door is closed the meter movement is free since the angle presses back the lever (1) of the spring-loaded rear locking rail. It is advisable to lock the writing lever again by sliding the locking angle back when the recorder is to be transported.

Switching the recorder on: The on/off switch is in the lower right-hand corner of the front panel of the Recorder Type XMA. When the set is switched on the glow lamp above the switch lights. When the clockwork for the paper drive has run down it is automatically rewound by the motor. The running noise of the motor is clearly audible.
The takeup mechanism can be started with the lever (5) within the recorder (see section 2.2.).

Front View


Recorder Type XMA, BN 444 512 D
Screws M 6 x 12 DIN 84-4 hv
Washers 6,4 DIN 125 St hv
R&S Standard Cabinet 581
Glow lamp; lights when the set is switched on
On/off switch
Connecting cable (LM 1201/100) for electrode pencil
Electrode pencil (BN 18594) for hand-writing on the recorder paper
Connector for electrode pencil
Connector for recorder paper being used outside the recorder without conductive connection
Operation selector
Terminals for test voltage

Rear View of Rack-mounting Unit



Tapping panel
(160-ma-fuse for 220 and 235 v,
300-ma-fuse for 115 and 125 v)

Tapping panel
(50-ma-fuse for 220 and 235 v,
100-ma-fuse for 115 and 125 v)

Shorting bar
(When writing more than one trace, the recording voltage can be automatically interrupted during switching, by a relay contact)

3-pole terminal for power cord

Input for test voltage (for operation within a Decade Frequency Measuring System)

1.2. Inserting the Recording Paper

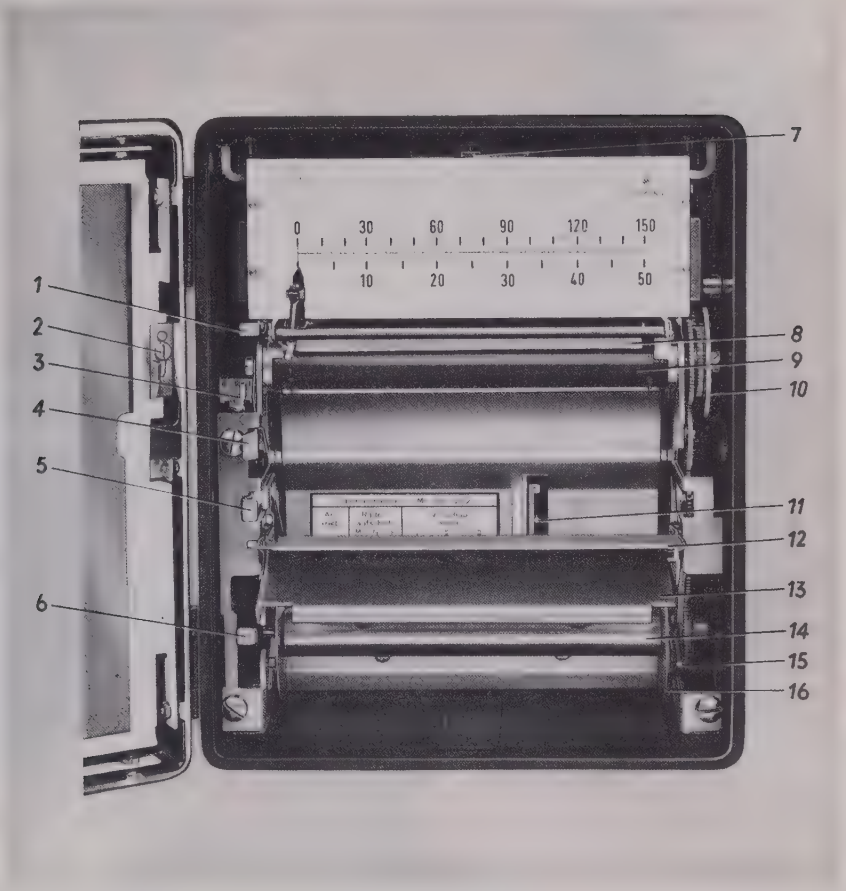


Fig.3: Recorder door open, takeup reel removed

Unlock the upper flap (12) by pressing the retaining spring (4) to the left, and swing it down. Remove the magazine reel and pull its two flanges apart until one of them glides out of the reel body. Push the paper roll on the reel until it touches the flange and replace the loose flange so that it touches the roll. Remove the fas ing band from the paper roll (R&S Stock No. OMP 18040). Holding the tapered paper end with your left hand, introduce the paper roll with your right hand into its place. The metal layer of the pulled-out paper end must be on top.

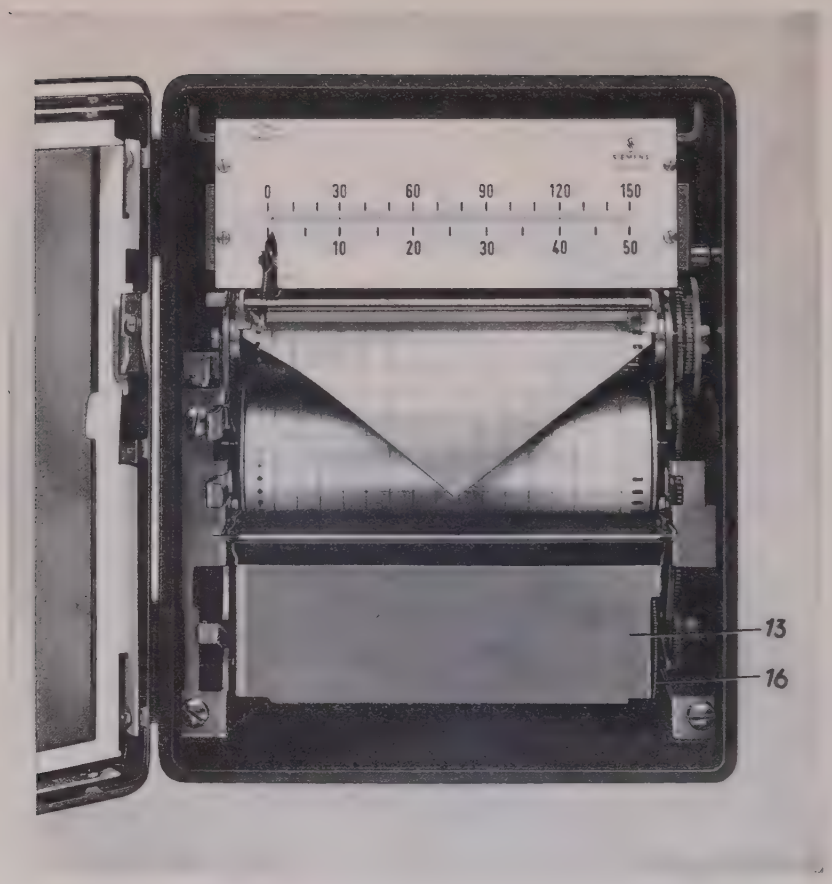


Fig.4: Magazine reel inserted, upper flap (12) down, lower flap (13) down

Slide the tapered paper end behind the sprocket roller (9) from below so that it appears again at the front side. Facilitate this movement by turning the knurled wheel (10) and take care that the transverse lines on the paper run parallel to the lower edge of the paper guide (8).

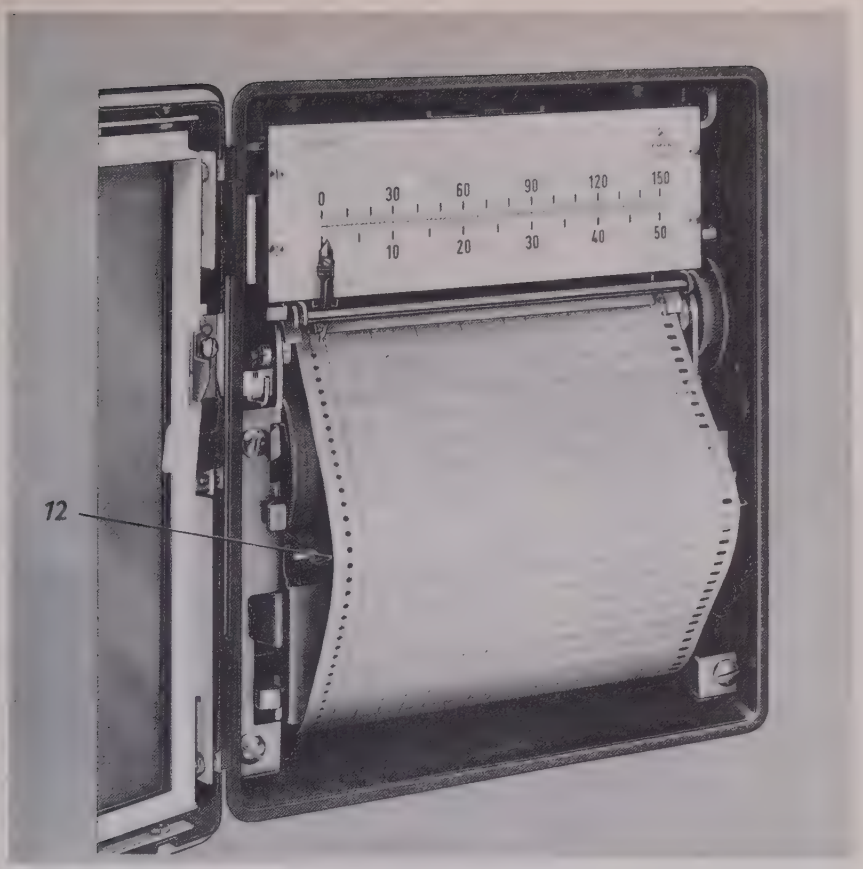


Fig.5: Upper flap (12) still down, paper completely inserted

To introduce the free paper end into the takeup reel (14) proceed in the following way:

Put the lower flap (13) up and release the takeup reel by pressing down the two levers (6, 15) securing its support; keep the right-hand lever (15) in the down position and take out the reel without canting.

Fold back the free paper end about 10 mm and introduce it into the slot of the reel. Turn the reel twice or thrice to prevent the paper from slipping out. The gear wheel should be to the right, and the lower side of the paper, i.e. the side opposite the metal layer, should lie on the reel.

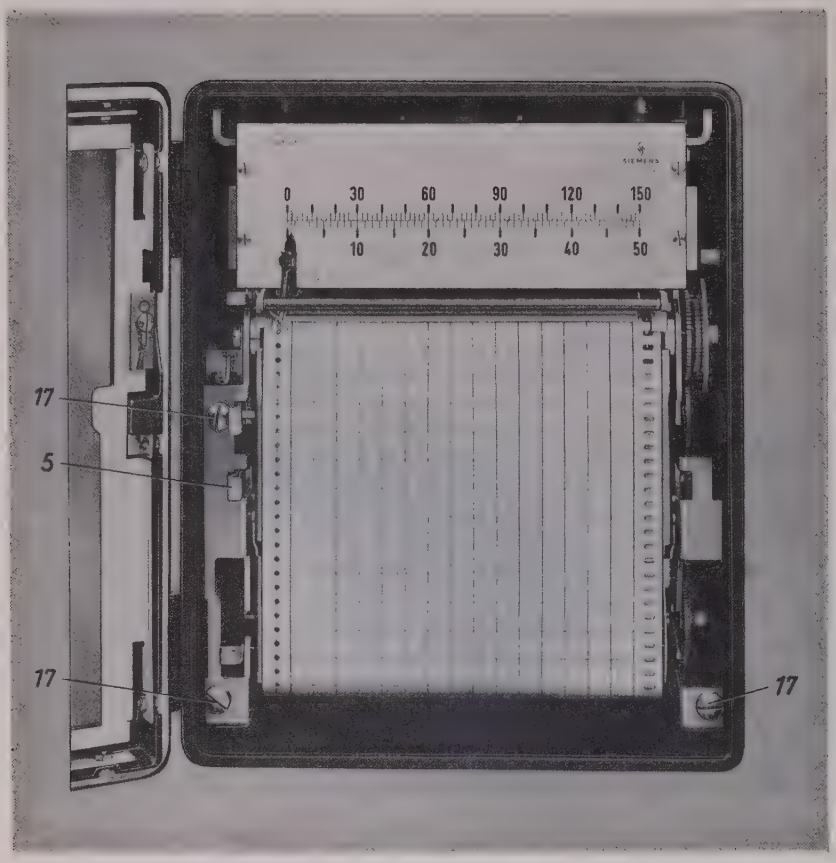


Fig.6: Paper completely inserted and stretched, automatic paper drive switched on (lever 5 pulled out)

Check that the loose flange is pushed on the reel as far as it will go. Put the reel back in place and return the left-hand lever (6) to its upper lock position. Put the lower flap (13) down, the upper flap (12) up so that it is in its original position after locking in of the retaining spring (4), and stretch the paper by turning the knurled wheel (16). The takeup reel is coupled with the paper drive through a slip friction clutch and automatically winds up the paper.

2. Operation

After the preparation for use of the recorder has been completed the recording of the measured quantity can be commenced.

The Recorder Type XMA is primarily intended for use in conjunction with the Frequency Indicator Type FKM. This combination permits automatic recording of frequency variations, for example of a crystal oscillator, over a long period of time. With respect to current requirement and scale graduation the Recorder Type XMA is adapted to the Frequency Indicator Type FKM. The scale of the Recorder Type XMA has one graduation from 0 to 50 and another from 0 to 150. For the ranges of indication f_x or f_d 0 to 50 cps, 500 cps, 5 kc, 50 kc and 500 kc of the Frequency Indicator Type FKM the lower graduation, 0 to 50, is applicable and for the ranges of indication f_x or f_d 0 to 150 cps, 1.5 kc, 15 kc and 150 kc the upper graduation, 0 to 150, is valid. No range selection is to be made on the Recorder Type XMA.

The Recorder Type XMA can, of course, be used for recording any measured quantity. It can be operated independently of the Frequency Indicator Type FKM, if the measured quantity can be converted into a direct current suitable for indication by the meter movement of the recorder.

A built-in rectifier delivers the voltage necessary for burning the trace. This voltage is effective between the metal layer of the recorder paper and the writing electrode.
Ink recording is also possible if desired. Suitable papers and pens are available (see data sheet for Recorder Type XMA, recommended accessories).

2.1. Applying the Test Voltage

The set has two separate inputs for the test voltage. A pair of terminals is provided on the front panel and a pair of clips on the rear connector strip. If the Recorder Type XMA is used within a Decade Frequency Measuring System, a connection to the Frequency Indicator Type FKM is established automatically via the rear connector when the unit is slid into the cabinet rack.

The two terminals on the front panel are marked "+" and "-". Take care to connect the patch cord for applying the test voltage with correct polarity.

After the test voltage has been applied, set the selector switch to select the desired input. In the positions TERMINALS - INDICATION and FREQUENCY INDICATOR - INDICATION the writing voltage is not yet applied to the recording electrode and the measured quantity is not recorded but only indicated by the meter movement of the recorder; the door of the recorder must be shut since with the door open the writing lever is automatically locked. Checking of the indication and adjustment of the mean value of the measured quantity to a value favourable for recording are best made in one of the INDICATION positions.

Next switch to TERMINALS - RECORDING or FREQUENCY INDICATOR - RECORDING; only then is it possible to obtain a trace.

The measured quantity is indicated by a D'Arsonval meter movement of the class of accuracy 1.5; the maximum meter current is 10 ma (full-scale deflection), the impedance about 55 Ω.

2.2. Switching on the Paper Drive and Selecting the Paper Speed (20/60/120 mm/h)

With the test voltage switched off (selector switch in position "0"), open the door of the recorder and pull out the lever (5) to release the paper drive.

To adjust the beginning of the trace to a given time mark (transverse lines of the paper) rotate the knurled wheel (10) to turn the paper downwards about 10 mm beyond the desired line and then back to this line; thus the backlash in the gears of the drive is eliminated. For this reason it is advisable to turn the knurled wheel forward and back as described each time the paper feed mechanism has been manipulated.

The Recorder Type XMA is designed for the paper speeds 20/60/120 mm/h, obtained in the respective lever positions I, II, III. To change the speed, press the lever (3) down and engage it in the position corresponding to the desired speed. It is advisable to turn the knurled wheel (10) at the same time to obtain proper meshing of the teeth.

The Recorder Type XMA is then ready to operate; shut the door and connect the test voltage; set the selector switch in the position TERMINALS - RECORDING or FREQUENCY INDICATOR - RECORDING.
When a long trace has been written, small particles of the burnt metal layer will have accumulated round the tip of the writing electrode; the trace will thus become broader. Remove the contamination with the cleaning brush supplied with the set.

2.3. Changing the Paper Speed (5/15/30 or 10/30/60 mm/h) by Gear Change

The three selectable speeds 20/60/120 mm/h are sufficient for most cases. By changing the gears it is possible to modify the recorder for the speeds 5/15/30 mm/h or 10/30/60 mm/h (see data sheet for Recorder Type XMA, recommended accessories). Remove the three screws (17) at the front and the 6 screws (18) at the rear of the cabinet as well as the clamps of the wires (19) after having withdrawn the two covers (20). The unit can then be pulled out of the cabinet. To change the speeds it is only necessary to replace the gear wheels M and P (Fig. 8) at the right-hand side of the unit. The idle gear wheel N is adjustable.

When replacing the two gear wheels, loosen (do not remove!) the two slotted screws (21) accessible through the holes of the idle gear wheel, adjust the latter so that it fits the newly inserted gears and fix it in this position by tightening the two screws. Place the unit back into its cabinet proceeding in the reverse order (see Figs. 7 and 8).

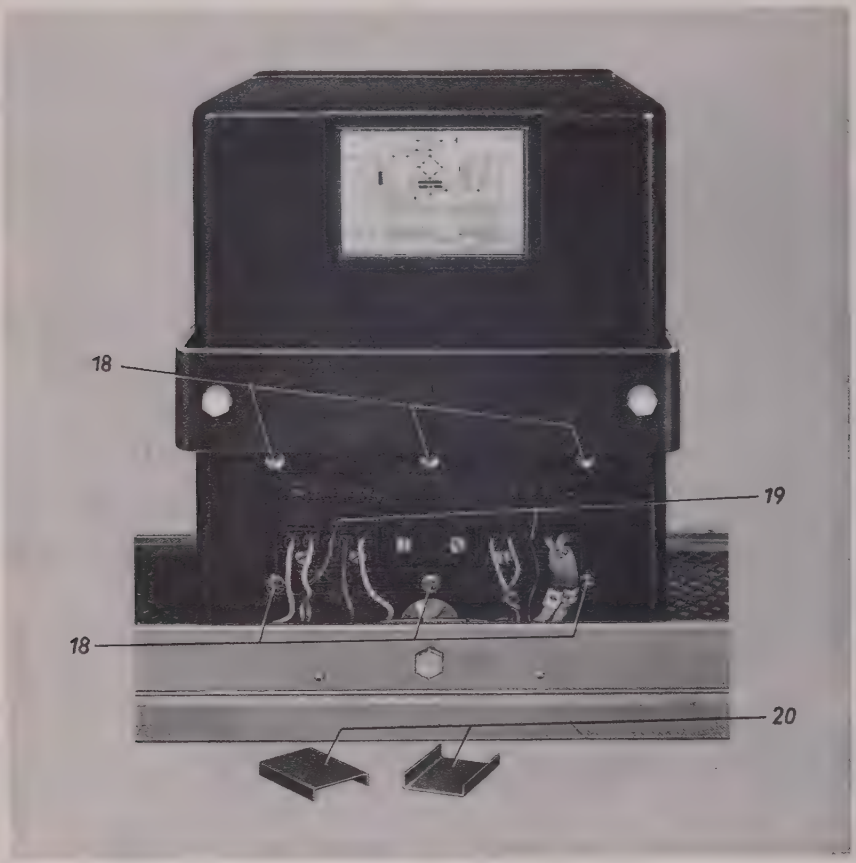


Fig.7: Rear view of recorder cabinet, covers (20) removed

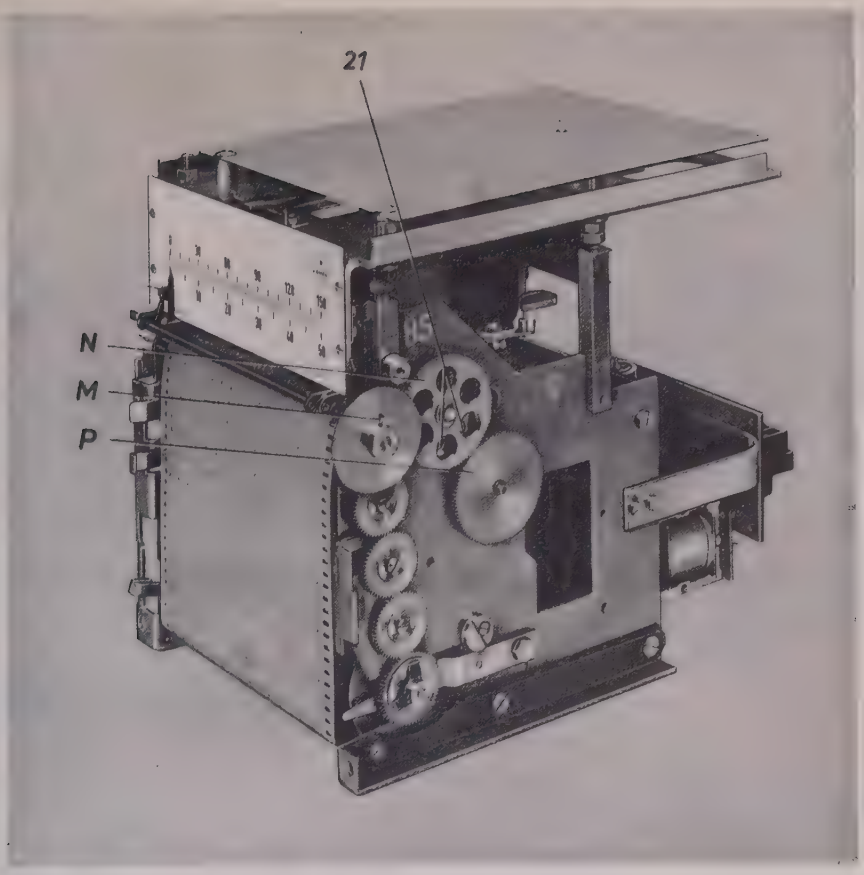


Fig.8: Unit with replaceable gears (M and P)

2.4. Taking out the Used Recorder Paper

Remove the takeup reel from the recorder (see section 1.2.) and take off the paper roll after removing the loose flange. It is advisable to photocopy important records as soon as the metal paper is taken out of the recorder and to touch the metal layer of the paper as rarely as possible with your fingers since it may be damaged by the effect of humidity. Treatment of the record with polystyrene varnish assures a certain protection against corrosion.

2.5. Use of the Scale Rulers

A scale ruler graduated from 0 to 50 and 0 to 150 is supplied with each Recorder Type XMA for accurate evaluation of the curves. The calibration of this ruler is not referred to the graduation of the paper but to the actual response of the recorder after it has been calibrated. Thus the ruler helps to eliminate the unavoidable small deviations from the paper graduation in the evaluation of the recorded trace.

For reading, place the zero of the ruler on the zero line of the paper so that the true value of any point of the record can be read on the scale of the ruler.

When a number of recorders are operated take care not to mix up the scale rulers. Check that the serial numbers imprinted on the scale and on the scale ruler are identical.

2.6. Use of the Electrode Pencil (Stylus)

Handwriting on the records is possible after completion or, preferably, when the record is still in the recorder, using the electrode pencil for writing on metal paper (BN 18594) and the "connecting cable for electrode pencil (LM 1201/100)" recommended in the data sheet for Recorder Type XMA. Connect to the terminal marked STYLUS on the front panel. When the pencil is connected and its tip touches the metal layer of the paper, a trace is burnt into the metal layer in the same manner as by the recording electrode in recording.

When the record has been taken out of the recorder and there is no conductive connection between the metal layer and the set, connect the metal layer by means of a connecting cable to the PAPER terminal on the front panel.

3. Maintenance

3.1. Checking and Correcting the Mechanical Zero of the Recorder

When the test voltage is disconnected (selector switch in position "O") the recording electrode must write on the O line. Any deviation can be corrected by shifting the lever (7) sidewise. To do so, open the door of the recorder and press back the lever (1) of the spring-loaded rear locking rail so that the writing lever is released. During the adjustment advance the paper by turning the knurled wheel (10) in order that the recording electrode glides more easily on the metal paper.

3.2. Adjustment of the Takeup Mechanism

The paper drive is ensured by a mechanical clockwork with automatic electrical rewinding. With the upper flap (12) turned down and the magazine reel removed the clockwork can be adjusted by shifting the lever (11) towards "-" (slower) or "+" (faster).

3.3. Maintenance of the Drive

It is recommended that the clockwork be cleaned and lubricated by an expert at regular intervals of several years.

3.4. Replacement of the Recording Electrode

To replace the recording electrode, hold the writing lever and pull the electrode out of the retaining sleeve. Introduce the new electrode in the reverse order. When inserting the cylindrical end of the electrode into the sleeve take care that the sleeve definitely locks in place. If ink recording is desired, a suitable ink pen (see data sheet for Recorder Type XMA, recommended accessories) can be inserted in the same way.

Guarantee

Rohde & Schwarz guarantee

F O R O N E Y E A R

each instrument manufactured and sold by them to be free from defects in material and workmanship, subject to clause 5 of their terms of delivery and payment.

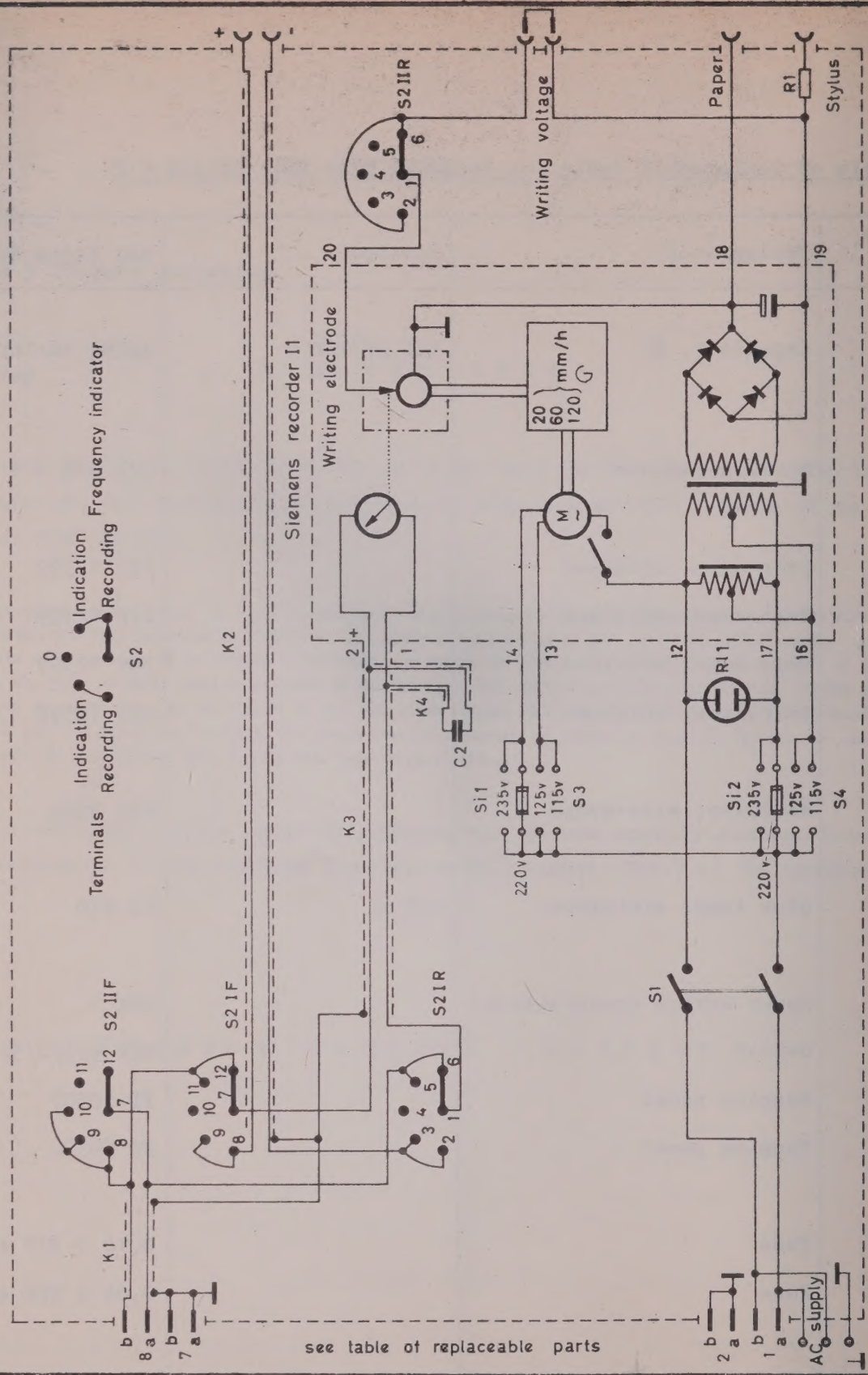
This guarantee does not imply the right so rescind a scale or demand a reduction in purchase price. The firm's obligation under this guarantee is limited to the repair or replacement of the defective part or parts, provided the claim is asserted in writing immediately, or within one week at the latest, after discovery of the defect. The part or parts shall be returned to the factory, with transportation charges prepaid, within one week from the instruction by the firm to do so. The return charges shall likewise be covered by the purchaser. The firm does not assume any liability for damage resulting directly or indirectly from the defect. The guarantee shall be void if the part or parts have been tampered with.

When asserting a claim under this guarantee, please specify number, date and reference of the invoice, type and serial number (FNr.) of the instrument.

R O H D E & S C H W A R Z · M Ü N C H E N

Table of Replaceable Parts for Recorder Type XMA, BN 444 512

Ref. No.	Designation	Ratings	R&S Stock No.
C2	Capacitor, MP	128 µf/160 v	4xCMR 16+16/160/2 parallel
I1	Siemens Recorder		444 512 - 8
K1	Twin wire, shielded		LKS 12399
K2	Twin wire, shielded		LKS 12399
K3	Twin wire, shielded		LKS 12399
K4	Twin wire, shielded		LKS 12399
R1	Resistor, wire-wound		WDG 50/4
R11	Glow lamp, miniature	220 v	RL 210
S1	Power switch (combination)		SRK 1
S2	Switch		SRN 323/2/32
S3	Tapping panel		FD 60507
S4	Tapping panel		FD 60502
Si1	Fuse		0,16 C DIN 41571
Si2	Fuse		0,05 C DIN 41571



ROHDE & SCHWARZ MÜNCHEN			Halbzeug, Werkstoff		Untolerierte Maße	Zeichn. Nr.	
						444 512 S	
	Tag	Name	Änd.-zust.	Änd-Mittlg. Nr.	Tag	Name	Maßstab	Ersatz für
gezeichnet	29.3.56	Hausd.	a	--	12.12.57	Volk		
bearbeitet		Volk	b	5262	17.1.58	Volk	Stromlauf zu	
geprüft	22.1.58	Ba	c	6219	9.10.59	Volk	Recorder Type XMA	
normgepr.								

MP MASTER
MA22479